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Post-War Building

The foundry industry is profoundly interested in post-war housing, because not only are many thousands of foundry operatives directly dependent for their living on building construction, but an equal number of others are indirectly so. The chief consideration, however, is not the sectional interests of our industry, but the rapid construction of tens of thousands of homes of which their occupiers can be proud. We have studied with profound interest the dozen Papers on this subject presented to the Royal Society of Arts; the speeches of responsible Ministers of the Crown, and the objectives of the Committee for the Industrial and Scientific Provision of Housing. As a result, we have arrived at the conclusion that the traditional methods of design and construction must go by the board. We make this our first stipulation because most faults of the more modest homes are due to a misguided effort to ape the genteel. The tiny kitchen and two reception rooms result in the former being inefficient and one of the latter too often being virtually a useless showplace. The two main objections raised against the large kitchen and one reception room are not insuperable. The first is that there is the presence of the smell of the cooking, and the second, nowhere for the children quietly to undertake their home studies. The former is overcome by the provision of proper ventilation, and the second by suitably furnishing and heating bedrooms. The traditional methods of heating and cooking by coal-fired open grates must also be changed, as they are uneconomical and antisocial because of the smoke emitted. A continuous night and day hot-water service is indispensable and there is a general leaning towards the Aga type of stove as being the solution. The open coal fire progressively looses its appeal with modern standards of lighting. Another factor acting against the traditional construction is the fact that so many of the components, especially those of timber, were imported, and for some years to come we must rely on home-produced raw materials. One feature must, however, be retained, and that is the provision of standardised factory-made components, and that in ever-increasing quantities. This does not mean that each house must be exactly the same or even similar. It is surprising the variety of designs a child can evolve from a set of "Minibrix"! Where a change must be made is the material reduction of time between the arrival of the components on site and the actual completed construction, associated with a reduction in the drying-out period. The Committee for the Industrial and Scientific Provision of Housing is paying special attention to these practical aspects to which we have called attention. The Committee is seeking the active co-operation of all the many interests for the consummation of this desirable end. It is cheerful to be able to state that so far as the foundry industry is concerned, it is in a position actively to collaborate with any scheme involving the quantity production of existing or of new designs of castings. We have been asking eminent architects if they have any objection to the use of iron castings, and the invariable answer is that they require periodic painting. The industry has an effective reply in vitreous enamelling or other weather-resisting treatment. We gather the Committee has in mind, for unit wall construction, an outer metallic casing, separated from an inner "Beaver" boarding, by an insulating material, carried in a steel framing. Such a construction could be faced with bricks or, again, vitreous enamelled. Floors, it is suggested, could be made from processed slag, instead of imported timber. The problem is so gigantic, however, that there is room for activity of every reasonable character to have full play, providing there are minimum standards of adequacy laid down by the authorities, whilst safeguarding the general aspect of the countryside.

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BOOK REVIEW

Modern Core Practices and Theories. By Harry W. Dietert. Published by the American Foundrymen's Association and obtainable through the Penton Publishing Company, Limited, 2, Caxton Street, Westminster, London, S.W.1, at 30s. for members of the A.F.A. and 42s. for non-members.

The first thing to emphasise is that this is a book about core making and not moulding sand. This statement is made because one so closely identifies the author with sand testing that a book on this subject could have been expected. Moreover, the author has had the collaboration of many individuals in order to present a complete story. From the non-American aspect, the second chapter need not be studied more than superficially, as it treats of the national types and deposits of silica sand. It will come as a shock to most that the binder listed as Class I is ice, and reference is made to Russian experience on this subject, where frozen cores have been successfully used. Personal experiments by the author confirmed the possibility of the system. The next interesting binder described as "for future" experiment and use is listed amongst Class II as silicon esters. Class III embraces the fish and vegetable oils, and this subject is treated by detailing the physical properties and the specifications which have been issued in connection therewith, following the presentation of experimental data on strength as related to drying conditions. Class IV details the addition of clay to cores, usually, of course, with other materials. Sawdust, straw and suchlike materials are classified as "fillers" and not as binders. This excellent chapter finishes with some good notes on many interesting topics. The practical man will revel in Chapter IV, which details the mixtures for all sorts of jobs. Even though references are made to "Albany" and other American sands, the practical man should have little difficulty in finding an equivalent. The final tip, that of weighing the materials instead of measuring, when compounding mixtures, is shown to be a real essential. Next the author deals with the storage, conditioning and distribution of sand, and an insight is given as to the immense scale on which the foundry industry is conducted in the States, though the smaller type of foundry is also catered for. The reviewer thinks that in the next edition more information should be given under this heading, and it would be useful to include, for instance, the type of information the JOURNAL gave when describing the Lister plant at Dursley. The reproduction of Fig. 63 is, unlike all the other illustrations, so poor in the copy under review as to be useless. It appears that, as in this country, no cut-and-dried apparatus has been evolved for the storage hoppers above the benches. It is the reviewer's experience that a wide tube filled from a flooring erected above circular benches and terminating about six inches above the centre of each bench, is the most satisfactory. It is matter for comment that Mr. Dietert uses the word "dryer" for the component used for taking care of green core during its passage through the oven. Many terms are used for this, but of the more common ones, probably "carrier" is the most apt. This word occurs in the chapter on core-making, which is the best account we have seen on the subject. It includes not only the quantity production of cores, but the making of large one-off jobs, and gives detailed attention to core-blowing machines. It includes a fairly long description of Stobie's original idea of a core-blowing machine, which he later abandoned when he devoted his attention to the Sandon-tap system of moulding. The development of this latter process has been temporarily arrested by the death of the inventor. The chapter on core ovens gives a splendid background for the study of the subject, and its treatment covers all the types commonly used in this country, whilst the finishing of cores is a study which has seldom found expression in technical literature. Coatings get, as they well merit, a special chapter, and information which will be novel to many readers is included. The balance of this book, which runs to over 550 pages, illustrated by 300 diagrams and pictures, contains chapters on handling; testing; quality control; core setting; shake oils; sand reclamation; surface considerations; economics; and defects. The reviewer dislikes this cataloguing of contents, but descends to it because of space considerations. The book is unquestionably the finest text-book on the subject ever published, and it will remain the standard work of reference for many years.

V. C. F.

INSTITUTE OF BRITISH FOUNDRYMEN

LONDON BRANCH, EAST ANGLIAN SECTION

At a meeting held on June 27, at the Central Library, Ipswich, over which Mr. G. Hall presided initially, Mr. C. J. Lake was formally inducted into the chair. The new President, in the course of a short address, referred to the impact of war conditions through Ministerial orders on the industry and the necessity for technical development to ensure their most economical application. The address was followed by a Paper from Mr. J. King on "The Making of the Specimen Casting in Meehanite."

Durability of Ciment Fondu.—A little over 10 years ago the Halifax (Nova Scotia) Harbour Commissioners were faced with the problem of replacing a harbour pier which in 11 years had decayed through the combined action of sea-water and ice. Considerable interest was aroused in Canada when a conditional order was placed with a British firm to the value of £120,000 for cement to be used in the construction of the new quarter-mile-long pier. The cement chosen was Ciment Fondu Aluminous Cement, which the manufacturers—Lafarge Aluminous Cement Company, Limited—guaranteed would not deteriorate under the severe conditions. The manufacturers agreed to deposit a heavy financial guarantee for a period of 10 years; the pier was built and now, the 10 years having expired, the full amount of the guarantee has been refunded.

THE SUBSTITUTING OF HIGH-DUTY GREY IRON FOR STEEL CASTINGS

By J. BLAKISTON, A.I.Mech.E.

Presented at the Annual Conference of the Institute of British Foundrymen on June 20 last

(*Continued from page* 251.)

Production Considerations

Having finally convinced his customers as to what he can make his irons withstand, the small-scale manufacturer will probably then be faced with a reaction in the opposite direction, and unless he is firm he will be persuaded to attempt to make all types of castings formerly made in cast steel and from forgings, which may be impossible. He must undertake this new work with caution lest it be to his detriment.

He has various courses open to him as to how to manufacture these new irons. He can either obtain the advice of one of the existing consultants, many of whom have done a considerable amount of pioneer work in the interest of his requirements, or he can adopt one of the proprietary methods, after he has come to a satisfactory agreement as to his capabilities with the proprietors of these processes, or finally he can attempt some of the easier grades on his own initiative, availing himself of some of the excellent foundry literature which has been published on this matter, and after becoming proficient in the easier grades he can work up to the more advanced types with confidence. It is only necessary to have reasonably efficient foundry equipment to produce these metals, and no heavy expenditure need be incurred in the earlier stages.

The key to correct metal melting for the production of high-duty irons is "regularity," and this is one of the main and most troublesome factors to be dealt with. This word applies to ordinary iron, but it is surprising how often the point is overlooked. It is proposed to describe briefly the method of operating the cupola to produce some of the lower grades of high-duty iron, *viz.*, those covered by British Standards Specification No. 786, grades 1 and 2.

After these grades have been made it is a simple matter for the producer to work up to the higher grades with a degree of confidence. The cupola has been chosen because it still is, and is likely to remain, the most popular and most efficient melting unit for the small foundry. Even when other types of furnaces are introduced it is most economical to charge them with molten metal already pre-heated by the cupola.

Coming back to the statement of the essentiality of regularity, a start must be made with four gauges:—No. 1 for taphole diameter; No. 2 for slope of furnace bottom in relation to taphole; No. 3 for stack diameter to ensure that every time the furnace is daubed and patched it will resume its original size, and No. 4 for height of bed above tuyeres, which is measured from the charging door after the bed has burned up prior to final charging. These four gauges should be kept in a prominent position and used daily.

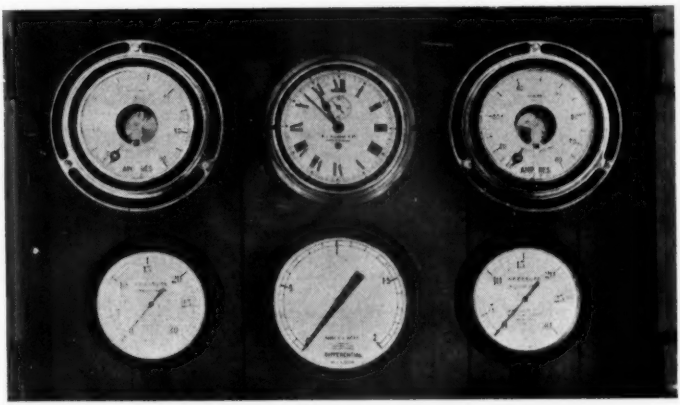

FIG. 18.—CONTROL BOARD.

Cupola Operation

The next point determining regularity includes materials used, including coke, limestone and air.

High-Duty Grey Iron as Substitute

The materials to be melted, whether pig, scrap metal or steel, should not exceed 1/3rd the furnace diameter in length, nor be less than 1/5th, nor should a flat piece of scrap exceed 1/6th the cupola area. The charge should be distributed so that the larger pieces are to the outside. The steel should be on top of the pig-iron and scrap, and any alloy addition should be in the centre. The coke should be from 4 in. to 5 in. cube. Long fingers, while indicating good coke, should be broken to these limits before charging. The volume of air is also an essential factor and is more important than pressure. The volume can be recorded by either a revolution counter in the case of positive and semi-positive blowers, an ammeter on the electrical power supply, or a Pitot tube with differential gauge in the case of all types of blowers. The blast volume should be about 14 cub. ft. per lb. of charge melting. This is an appropriate figure dependent on many variables, including the altitude of the foundry.

FIG. 19.—CUPOLA SLAG BATHS.

While operating, the cupola must be worked in a regular manner to a timetable, the same weight being run out per tap as is charged in at the charging door at fixed time intervals. Fig. 18 shows an inexpensive cupola control board for two furnaces, with the following units:—One differential gauge for volume connected by two-way cocks to a Pitot tube in each blast main; electric-motor ammeters whose readings vary in direct relation to the blast volume; Budenberg pressure gauges, reading in in. of water (read much more clearly than orthodox water or mercury gauges); and a ship's clock which stands up well to foundry conditions.

Once the ideal melting conditions have been attained, the readings of these gauges should be noted and preferably marked so that the conditions can be maintained. To assist good working the vicinity of the furnaces should be kept clean, and Fig. 19 shows the backs of 6-ton and 8-ton furnaces regularly producing high-duty iron. It will be noted that the slag is handled in a similar manner to that used on blast furnaces. Apart from keeping the vicinity of the furnaces clean, the chilled slag obtained can be sold to local builders.

Fig. 20 shows two small furnaces of 15 cwts. and 20 cwts. capacity, designed for the production of high-duty iron, the outstanding features being:—(1) Wind belt independent of furnace casing being supported by the tuyeres. This eliminates the possibility of wind leakage caused by burst seams through furnace distortion. (2) Wide-area tuyeres each with independent damper control.

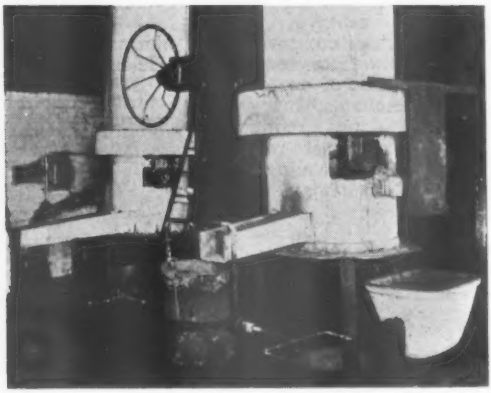

FIG. 20.—SMALL CUPOLAS.

Details of Two Furnaces

It is not proposed here to give all details of charging to cover any cupola, as each furnace has its own peculiar characteristics, but detailed charge and furnace dimensions will be given for a 6-ton and 20-cwt. furnace, both of which have been proved in constant operation. Fig. 21 shows the lines of a 5- to 6-ton per hr. furnace. It will be seen that the furnace has a fairly long stack to ensure preheating, also an ample tuyere area of about 350 sq. in.

The depth of bed charge is also shown as 48 in. above the centre line of the top tuyeres. This

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high-bed charge assists the preheating so that the early metal tapped out is hot. The fan volume and pressure should always be on top of the maximum required and provision for checking down must be made and should be operated from a convenient

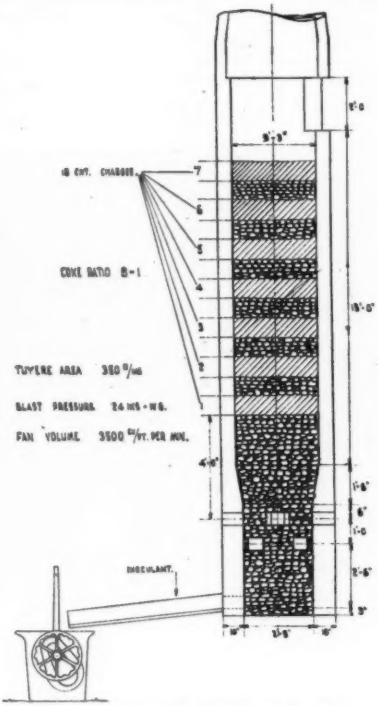

FIG. 21.—6-TON FURNACE LINES.

position. It is important that the air volume should be kept constant by observing the meter readings and checking down accordingly, particularly during the latter end of the blow. The weight of metal per charge suggested is 10 cwts., but this can be varied till the correct charge for smoothest working is obtained.

Fig. 22 shows a 20-cwt. furnace, which is an exceptionally handy size to have in any foundry, especially the small foundry, as it enables an economical blow to be made every day and so saves the unnecessary number of box parts which are required when melting takes place only two or three times a week. The height of the bed charge in this case is 39 in. above the centre line of tuyeres, which has a total area of 80 sq. in. 550 cub. ft. of blast is required per min. at a pressure of 8 in. w.g. This low blast-pressure is advisable on small cupolas or a final iron too low in carbon will be obtained.

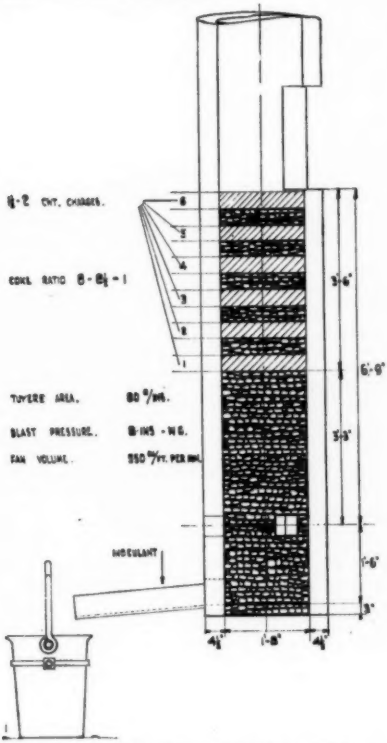

FIG. 22.—20-CWT. FURNACE LINES.

Composition of Irons

Take the analysis of a grade 1 or 2 high-duty iron for general work of some ½ in. to 1 in. section to be 3.0 to 3.1 total carbon, 1.85 Si, 0.12 S, 1 Mn, and 0.3 per cent. P. Lower carbon will produce a higher tensile test, but for general jobbing work it is not advisable to have the total carbon content below 3 per cent. or trouble and complications may occur beyond the scope of the small iron-founder. This silicon content can be varied to suit casting section, either by adjusting the charge or the amount of inoculant. The high sulphur content, which would have been a danger on the older types of cast iron, is associated with nearly

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all high-steel content melts, and can be nullified by casting hot and maintaining a manganese content at 1 per cent. by the addition of ferro-manganese or spiegeleisen to the charge. The phosphorus content should never exceed 0.3 per cent., and the lower this figure the greater the shock resistance of the final casting.

The foundry undertaking high-duty casting should have the following metal stocks available,

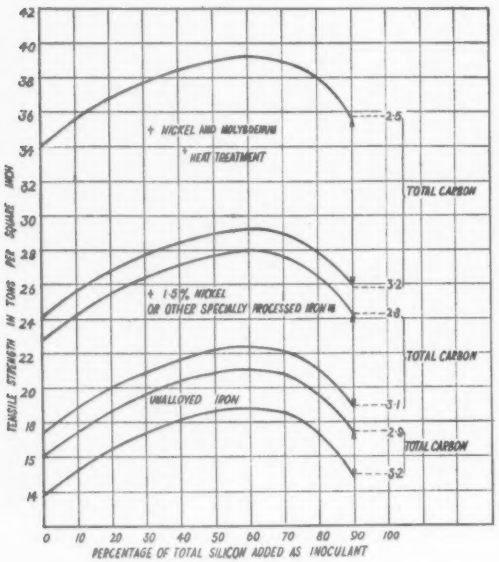

FIG. 23.—EFFECT OF COMPOSITION AND PERCENTAGE INOCULANT ON TENSILE STRENGTH. (THIS CHART DOES NOT APPLY TO IRONS PROCESSED BY OTHER INOCPLANTS.)

the analysis of the various items being given by the suppliers:—

Stock No.	Description.	T.C	Si	S	Mn	P
A	Low phos. ..	4.0	2.0	0.04	1.0	0.05
	,, ,,	3.9	2.0	0.05	1.0	0.2
B	Medium phos.	3.5	2.5	0.06	0.8	0.5
C	,, ,,	3.5	3.5	0.06	0.8	0.5
D	Steel scrap ..	0.2	0.1	0.05	0.4	0.05
E	Refined iron or shop returns	3.0	1.85	0.06	0.8	0.3

If no refined iron or return scrap is available, a virgin charge would be: 10 per cent. stock A, 40 per cent. stock B, 50 per cent. stock D, plus 1 lb. of 75 per cent. ferro-manganese per cwt. charged, and 1½ lbs. of 75 per cent. ferro-silicon inoculant per cwt. tapped. After this mixture has been established and shop returns materialise, the future charges would be: 10 per cent. stock A, 20 per cent. stock B, 20 per cent. stock E, 50 per cent. stock D, plus 1 lb. of 75 per cent. ferro-manganese per cwt. charged, and 1½ lbs. of 75 per cent. ferro-silicon inoculant per cwt. tapped. The analysis of the finished casting would be approximately as follows:—T.C 3.0 per cent. Si 1.85, S 0.09, Mn 0.9 and P 0.23 per cent., with good physical and casting properties.

FIG. 24.—ACICULAR STRUCTURE.

Melting Losses and Inoculation

During melting, the probable silicon loss due to oxidation will be 20 per cent. and manganese loss 25 per cent.; also approximately 5 per cent. of silicon added for inoculation is lost due to deoxidation of metal. The carbon is maintained constant and free from well pick-up by tapping regularly at short intervals. The inoculation is carried out in the spout near the taphole. The melting coke required is slightly more than the normal 10 to 1 ratio, as some of the carbon is absorbed into the metal. The ratio suggested for this 50 per cent. steel charge would be 8.5 to 1. Four per cent. of 2-in. limestone per metal charge should be placed on the coke prior to each charge.

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It has been known for 70 years or more that the addition of steel to pig-iron in a cupola would produce a stronger material, so-called semi-steel, and also to raise the tensile strength of cast iron from a 9-ton tensile textbook figure to B.S. 321, Grade A, 11-ton tensile. What, then, might be asked, is the secret of the cast irons which have been produced during the last decade, which has necessitated the issue of a new British Standard Specification[5] doubling the tensile strength? This so-called secret is nothing more or less than adding ferro-silicon in crushed form to the metal stream and calling this involved and difficult procedure "inoculation."[6]

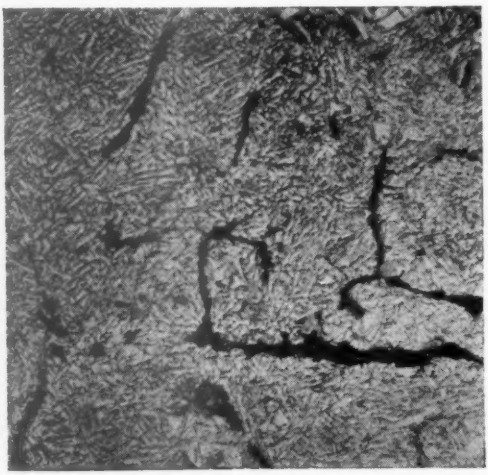

FIG. 25.—ACICULAR STRUCTURE TEMPERED.

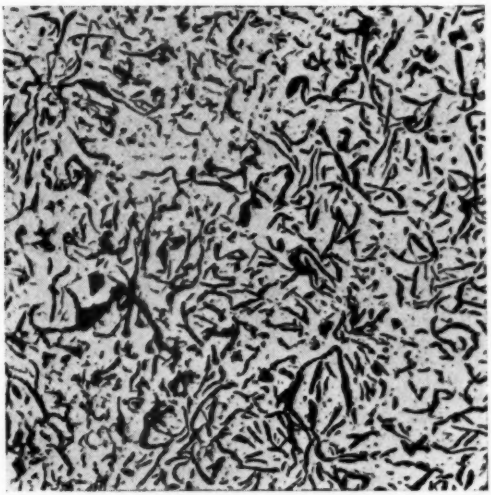

FIG. 26.—GRAPHITIC DISTRIBUTION.

Ferro-silicon is not the only material which has this property, but for the purpose of this Paper is taken as the most convenient. It should be added in pea-size granular form to the metal stream 10 min. before the ladle is required for casting. The effect of this procedure on the molten metal is not permanent, and after 15 min. the effect rapidly begins to wear off.

The foregoing has described in a brief manner the procedure which would be adapted for the satisfactory production of high-duty grey iron, and, provided these instructions are followed in a reasonable manner and the metal melted hot and regular, no difficulty should be experienced in meeting the necessary specifications. Indeed, after the foundry has been running regularly on this metal and has become permeated with high-duty metal in the shop returns, it will be found practically impossible to produce an iron in the lower 9-ton tensile range.

If the double of B.S. maximum specified strength has been achieved in less than a decade, one is justified in asking what is going to happen in the future. Is this phenomenal advance going to continue or is there going to be a lull in development? From current facts, this progress is accelerating.

Fig. 23 shows the effect of different inoculation percentages on different groups of cast iron. It will be seen that present knowledge shows that in various groups of iron the addition of approximately 60 per cent. of the silicon content as an inoculant produces the strongest iron.

Group A represents the irons whose methods of production have just been described in some detail. This group meets grades 1 and 2 in the B.S.S. 786. Group B, which is produced in a similar manner, but may have less total carbon present and also may contain a small percentage of alloy in the form of nickel or some other metal, will meet the

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highest B.S.S. at present published, *viz.*, B.S. 786 grade 4. Group C, which, it will be noted, reaches a tensile strength of nearly 40 tons, is not a hypothetical case, but has been achieved. R. A. Flinn and D. J. Reese[7] have obtained 44.3 tons tensile with an iron of 2.3 per cent. T.C, 2.31 Si, 1.03 Ni and 1.36 Mo, heat-treated for 5 hrs. at 370 deg. C.

Acicular Irons

This new development in high-duty grey-iron research is being conducted simultaneously in

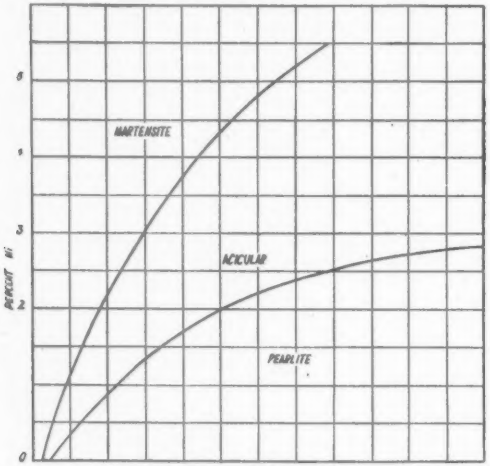

FIG. 27.—EFFECT OF NICKEL CONTENT IN RELATION TO CROSS-SECTION ON STRUCTURE.

England and America on slightly different lines. Two excellent Papers have been presented describing these developments by Flinn and Reese[5] and McRae Smith.[8] This type of high-duty iron is known as acicular or pseudo-martensitic iron; it has the following remarkable properties: Heat-treatment need not exceed 370 deg. C., *i.e.*, which can be carried out in the average foundry stove; Brinell hardness of 350 with machinability, *viz.*, 8 in. per min. milling with 18 per cent. tungsten cutters; tensile strength and yield point of 30 tons upwards; Izod shock resistance more than five times that of common cast iron; abnormal heat and crazing resistance.

Fig. 24 shows this acicular structure in the "as cast" condition consisting of needles of ferrite in a ground mass of austenite. After tempering at 320 deg. C. for several hours, the tensile strength is increased and a structure similar to that shown in Fig. 25, consisting of ferrite needles in a ground of decomposed austenite, is obtained. American practice up-to-date has favoured a tempering heat of 370 deg. C. to obtain the best results, while in this country 320 deg. seems to have been the chosen temperature.

The writer has attempted the production of these acicular irons on a commercial scale and has obtained some very good results. Concentration has been made on a total carbon range of 3/3.1 to render this iron adaptable for general foundry conditions. Experimenting still further an iron was produced with a total carbon content of 3.4,

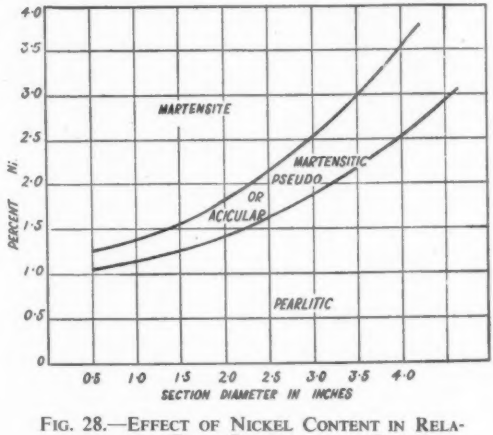

FIG. 28.—EFFECT OF NICKEL CONTENT IN RELATION TO CROSS-SECTION ON STRUCTURE (REVISED).

and even with this high carbon content 23 tons tensile was obtained on a 1-sq. in. section test-bar.

Fig. 26 shows the graphite distribution of this test-bar under 50 magnifications. The extremely curly and interlocking nature of the graphite, which is a characteristic of acicular irons, will be noted. The acicular range is sandwiched in between the pearlitic and martensitic, and accordingly close control of the nickel content in relation to the cross section of the casting is necessary to obtain the acicular structure clearly defined. Fig. 27 shows the effect of nickel content in relation to cross section as depicted by Flinn and Reese,[5] whilst Fig. 28 shows this range considerably

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reduced in the light of the author's experience on certain castings.

In view of the above it will be apparent that it is imperative that the general metal thickness of the castings to be produced should be constant and that only one casting section can be run in the foundry without changing the metal analysis. The first-named apparent drawback can be overcome by foundry co-operation with the design department, whilst the second drawback is overcome by foundry controlled planning.

Importance of Design

A word of warning to designers would not be out of place, suggesting that castings should not be asked for in a higher grade than is necessary to meet the purpose required with an adequate margin of safety, as the higher the physical properties required so the greater the difficulty in casting production, and it is not economical to specify a 30-ton iron with valuable alloys when a sound 20-ton iron will fill the bill.

It will be seen from this Paper, which has sketched the advance in grey iron in a simple and non-technical manner, that recent progress has been phenomenal, and while being used in many cases to further the war effort,[9] offers remarkable post-war opportunities. The foundry can do the job, but the engineer who is the consumer calls the tune, and must have these developments presented to him in an acceptable manner. Several individual attempts by certain concerns have been made with considerable success to publicise the merits of high-duty grey irons; surely this should not be left to one or two individuals, but should be the obligation of the original producer of pig-iron, *viz.*, all the pig-iron manufacturers acting as one body.

The author wishes to thank the firms who have contributed some of the excellent photographs, *viz.*, Craven Bros. (Manchester), Limited (Fig. 1), Wm. Asquith, Limited (Figs. 2, 4 and 5), International Meehanite Metal Company, Limited (Figs. 3, 6 and 14), Swift Summerskill & Company, Limited (Fig. 7), Worthington Simpson, Limited (Figs. 8 and 9), and Glenfield & Kennedy (Figs. 10, 11, 12 and 13), and also the friends who have kindly assisted him with their suggestions and information.

REFERENCES.

[1] The Manufacture of Crankshafts in High Test Cast Iron. By E. M. Currie and R. B. Templeton. "Trans. Inst. Marine Eng.," Vol. 53, 1941, Part 11, pp. 169-177.
[2] Some Points on Casting Production. E. Longden. "Foundry Trade Journal," Dec. 12, 1940, p. 379.
[3] Gear Castings with special reference to Cast Iron. "Foundry Trade Journal," July 22, 1937.
[4] Uses of Flame Hardening in Machine Tool Production. A. L. Hartley. "The Canadian Welder," Jan., 1942.
[5] British Standard Specification No. 786.
[6] Influence of Ladle Additions on the Properties of Cast Iron. E. Piwowarsky, "Foundry Trade Journal," May 2, 1940, p. 325; May 9, p. 350; May 16, p. 365.
[7] The Development and Control of Engineering Grey Cast Irons. R. A. Flinn and D. J. Reese. "Foundry Trade Journal," Jan. 8, 1942, p. 19; Jan. 15, p. 37; Jan. 22, p. 53.
[8] Melting and Casting Problems in the Production of High Strength and Special Duty Alloy Iron Castings. A. E. McRae Smith, Proc. I.B.F., Vol. XXXIV, 1940-41, pp. 73-99.
[9] The extended uses of Cast Iron with Special Reference to War Conditions. J. G. Pearce, "Foundry Trade Journal," June 13, 1940.

EMPLOYMENT OF WOMEN IN THE IRON AND STEEL INDUSTRY

The Iron and Steel Control (Ministry of Supply) has issued a booklet entitled "War-time Employment of Women in the Iron and Steel Industry." In a foreword, Col. Sir W. Charles Wright (Controller of Iron and Steel), stressing the necessity for employing women wherever possible, points out that the part-time employment of women is growing in the iron and steel industry, and this kind of employment can be increased to a considerable extent. It is likely that a large supply of women will shortly be available for the industry in many districts, and employers are therefore asked to continue to pursue the policy of substitution by the whole-time or part-time employment of women, as there are still many urgent demands for male labour both for existing and new works for occupations which cannot be performed by women.

In blast furnace plants, women are already engaged on the following process occupations:—Hoist driver, hauler driver; coke belt attendant; transfer car; stove changer; floaters; ore filler, loader; crushers, ore gantry; bell attendant; charging car mixers; general mixers; blast engine assistant; ignition car driver; wagon drop assistant; weighman; crane driver; coke loco driver; barnum trimmer; tile maker; furnace labourer; general labourer; sinter plant labourer; pug mill labourer, burner trimmer.

Women are also employed in various capacities in iron puddling, steel smelting, iron and steel rolling, and in maintenance and ancillary departments serving blast furnaces, steel melting shops and iron and steel rolling mills. In other sections of the industry, including foundries, the occupation of women is at present as follows:—DROP FORGING: 39 different categories in process occupations and 16 in maintenance and ancillary occupations. IRON FOUNDING: 45 process occupations and 23 maintenance and ancillary occupations. IRON AND STEEL TUBE, PIPE AND FITTINGS MAKING: 53 different process occupations and 27 maintenance and ancillary occupations.

MORE WASTE PAPER PLEASE!

AMERICAN EXPANSION PLANS FOR STRATEGIC METALS

In a recent memorandum C. B. Henderson, president of Metals Reserve Corp., reports, in connection with American domestic production of strategic materials, that the organisation has been active in effecting very large increases in the output of bauxite, chrome ore, manganese ore, and tungsten and vanadium ores, in co-operation with the Reconstruction Finance Corporation and Defence Plant Corporation. Necessary increases in the smelting capacity in zinc have been effected, and substantial increases in copper production were made. The production from the numerous important small producers of copper, lead and zinc were greatly stimulated by payment of substantial premiums over "ceiling" prices for a period of two and one-half years from February 1, 1942.

Plans are proceeding for the possible increase in production of high-grade bauxite in Arkansas to 2,000,000 long tons per annum, and for stocking any excess of current production over consumption. The programme represents a total increase of approximately 200 per cent. over 1941 domestic production of bauxite, and is scheduled to keep pace with increasing requirements for aluminium.

Chrome Ore

A total of 20,000 tons of high-grade chrome ore is to be delivered under contract from Alaska this summer. The same producer is to supply 400 to 500 tons per day of milling grade ore and arrangements have been made to mill this tonnage in Alaska. The Grey Eagle mill in California started operations in March at the rate of 15,000 tons of metallurgical grade concentrates per annum. Chrome ores are also to be purchased from small operators in truck-load lots from the numerous small chrome deposits of northern California and southern Oregon. Stockpiles and sampling facilities will be available at numerous points.

A major development is being carried out at three properties in Montana by D.P.C. and M.R.C., with Anaconda Copper Mining Company in charge of construction and operations. A production rate of 360,000 short tons per annum is planned from these three Montana properties alone by the end of 1942, which compares with the previous peak United States production figure of 92,400 short tons achieved in 1918. A mill for recovering chromite from bench gravels is well under way in Oregon, under contract to deliver 30,000 tons of chemical grade concentrates per annum.

Manganese Ore

The owners of the major portion of the large manganese reserves in Arizona are carrying out experimental work in a large pilot plant, and in Arkansas arrangements are being made for construction of a concentrating plant of 300 to 500 tons daily capacity. The production of manganese from the "black ores" of the Cuyuna Range, Minnesota, has been dependent upon the satisfactory solution of the metallurgical problems involved. After six months of pilot-plant operation conducted under the auspices of the corporation, it has been decided to use sulphuric-acid leaching for this ore. Negotiations are proceeding for the erection and operation of plant and for ore delivery for a plant of 200,000 tons per annum of 60 per cent. manganese nodules.

Anaconda Copper Mining Company is now producing high-grade manganese nodules (60 per cent. Mn) from its Montana beneficiation plant at the rate of 112,000 short tons per annum, and is making plans for increased production. Manganese Ore Company is to erect and operate a leaching plant under contracts which should be in production before the end of 1942 at a rate of 110,000 short tons per annum of high-grade sinter (63 per cent. Mn). In New Mexico, one company is now operating a small mill, and a second company designing a mill of 250 to 300 tons daily capacity. In South Dakota, the problems of the great low-grade Chamberlain deposit are:—(1) The recovery of nodules from the shales of the district; and (2) the conversion of these nodules into ferro-manganese. For the first problem, steps are being taken to produce approximately 300,000 tons of 16 per cent. nodules per annum, which will either be stockpiled for the present, or blended with high-grade concentrates if required. In addition to the above, Metals Reserve Corporation has made over 50 contracts for manganese production in 13 States.

Tungsten and Vanadium

Contracts have been made with three of the largest producers of tungsten to permit substantial increase in their production, and similar contracts are being arranged with numerous other producers. A retreatment plant will be erected in Utah to handle large tonnages of low-grade concentrates, much of which has hitherto not been recovered. Arrangements are being made for direct purchase of production from small producers. With the stimulation of a price of $24 per unit (of 20 lbs.) and of the above measures, it is expected that tungsten production will increase from approximately 6,500 tons in 1941 to a rate of approximately 19,500 tons by the end of 1942.

Arrangements have been completed for the rapid development of several of the lead vanadate properties in the west, which are of no economic interest under normal conditions. A programme is being developed for increasing the production of vanadium from the sandstone ores of western Colorado and eastern Utah. These two steps should result in an increase of about 60 per cent. in vanadium production as compared with 1941.

Zinc Die Castings.—Zinc die castings can be used in place of brass in many cases, the alloys suitable for this substitution having mechanical properties similar to those of brass, the elongation being, however, somewhat lower. Zinc castings are particularly suitable for boiler fittings. Some alloys with a very low Al content can be welded. Zinc alloys can also be used for bearings of red brass, states H. PONTANI in a review of the potential uses of zinc and zinc alloys as substitutes, in "Usine belge."

RAPID METHODS OF ANALYSIS OF PIG-IRON

OUTLINE OF PROCEDURE AT GERMAN STEELWORKS

Much progress has been made recently in speeding up the analysis of iron and steel during manufacture, mainly by the application of such modern techniques as potentiometric measurements, colorimetry, photometry and spectrum analysis. These developments have been most marked in American laboratories where a complete estimation of Mn, Si, Cu, Cr, Ni and Mo in iron and steel can be made in from 6 to 8 min. M. KEMPF in Report No. 152 of the chemical committee of the Verein deutscher Eisenhüttenleute, reported in "Stahl und Eisen" of February 12 last, suggests that this success has been achieved in America by the most careful organisation of every detail, but is only applicable where mass production on an American scale is feasible; for this reason, the American methods cannot be utilised *in toto* in European steelworks.

The chemical laboratories of the August-Thyssen-Hütte have therefore evolved a rapid technique, not by means of spectrum analysis as adopted in America, particularly by Ford, but by a rational organisation of ordinary chemical methods. The whole problem reduces itself to careful planning of each stage from the sampling of the metal to the communication of the final analysis. The present report describes in detail the procedure for the complete analysis of pig-iron at these laboratories, for Mn, P, S, Si and also C. Hitherto the time taken for these estimations, excluding time of sampling and preparation, was 8 min. each for Mn and S and about 20 min. for P; estimation of Si takes the longest time from a minimum of 25 min. to as much as an hour and more. These times make a complete analysis, including sampling and preparation, much too long for the operator to receive all analytical data of the pig-iron being worked during the blowing period. In the rapid method worked out at the August-Thyssen-Hütte the total time taken for the estimation of the four or five elements concerned has been reduced to about 6 min., or 9 min. including sampling and preparation. Sampling and analysis chits are transmitted by pneumatic conveyor, as rather a long distance has to be covered, which accounts for 3 min. more. This period can be appreciably reduced if the laboratory is closer to the stage and if a tele-transmitter is used.

Sampling and Preparation

Sampling takes place at the mixer stage with a small spoon while the ladle is being filled, and sample bars cast in a split copper mould of the tong type. After water quenching the samples can be removed immediately. These bars, which are notched at the middle to facilitate crushing, are 100 mm. long and 7 mm. in dia. The runner is knocked off and the bar then pneumatically transmitted to the laboratory, where each is powdered in a steel mortar with a compressed-air hammer for 30 secs. The powdered product is then screened (0.075 mm. mesh) and the through product used for analysis. The rest is discarded; check tests have shown that the through portion gives the same Mn, P, S and Si values as the original cast bar. The weight of the sample obtained is about 5 grm., sufficient for analysis. Sampling takes about 1 min., and preparation another 90 secs.

Analysis is carried out by a trained chemist A and three assistants, B, C and D. A receives the prepared samples, stamps the chit with time of arrival and passes the sample to assistant B at the balance. B passes a portion of the sample to assistant C at the next balance. B weighs the samples for Si and Mn determination, and C the P and S samples. Weighing takes about 30 to 35 secs. per assistant. A carries out the Si determination, B the Mn, C the S and D the P.

Results are entered on the chit by D, the time stamped, and the chit sent back to the operator requiring the analysis, either by pneumatic conveyor or tele-recorder. The balances are placed directly in the analytical laboratory and not in a separate room in order to save time; they are enclosed in hoods through which compressed air is passed from the rear as a protection against chemical attack. The compressed air is first washed by passing through a 5—1 wash-bottle containing K permanganate solution. Fume cupboards are provided for Si, P and Mn determinations, the exhaust ducts being provided with flameproof protection to counteract the danger of explosion from the perchloric acid used, in addition to other protective arrangements. These precautions seem to be adequate for in several thousand determinations there has been no explosion to date.

To expedite analysis, special pipettes are used for measuring out the liquid reagents used, as well as automatic filling and discharging measuring vessels and burettes with automatic zero adjustment. A modified form of Mars furnace is used for incinerating the silica precipitate, oxygen being passed into the rear of the furnace through a heat-resisting tube. The base of the furnace has three horizontal heat-resisting gas-tight tubes containing the Silit rods; this ensures high thermal efficiency and provides adequate protection of the Silit rods against oxidation.

Determination of Manganese

The Mn is determined by the persulphate/silver-nitrate method of R. P. Smith as follows: 0.1 grm. of the sample is dissolved in a 300 cc. Erlenmeyer flask in 25 cc. hot nitric acid (1.15) with the addition of 2 to 3 drops of perhydrol and heating on a plate. After solution, which takes about 2½ min., the sample is oxidised with 10 cc. Ag-nitrate solution (5 grms. per l.) and 20 cc. ammonium persulphate solution (200 grms. per l.) and heated, and then cooled to room temperature. Oxidation and cooling take 1 min. After adding 100 cc. water and 3 cc. NaCl solution (12 grms. per l.), titrate to decoloration with N/50 Na arsenite solution, the percentage of Mn being read off on a table corresponding to the volume arsenite solution titrated. Titration takes about ¾ min., and total determination with weighing 4¾ min. The arsenite solution is standardised against a standard sample of known Mn content employing the same analytical procedure.

Rapid Analysis of Pig-Iron

Determination of Phosphorus

This element is determined volumetrically after precipitation with ammonium molybdate; 0.25 grm. of sample is dissolved as for Mn determination, but 3 to 5 drops of perhydrol added (time: 1½ min.); the solution is then oxidised with 10 cc. K-permanganate solution (25 grms. per l.), which takes 1 min. The precipitate of MnO_2-hydrate formed is dissolved by adding 10 cc. ammonium-oxalate solution (40 grms. per l.), the P precipitated with 50 cc. ammonium molybdate and shaking well (ammonium molybdate solution prepared by dissolving 40 grms. of salt in 400 cc. water, adding 400 cc. (1.4) nitric acid and 65 cc. (0.91) ammonia and diluting with water to 1 l.). Precipitation and shaking take about 1 min. The precipitate is removed by a filter pump; the Erlenmeyer flask washed out twice and the filter tube six times with cold water. Filtering and washing take 1½ min. Filter pad and precipitate are transferred to a 300 cc. Erlenmeyer containing ready 10 cc. standardised NaOH (1 cc. of solution should correspond to 0.001 grm. P) and 30 cc. water. After dissolving the precipitate of phosphor ammonium molybdate in NaOH, add 100 cc. water and two drops of phenol phthalein, and titrate with sulphuric acid, which should be equivalent to the NaOH already added, until solution becomes colourless. Solution and titration take about 1 min.; total estimation with weighing takes 6¼ min.

Estimation of Sulphur

Sulphur is determined by combustion in a current of oxygen with electrometric titration of the sulphuric acid formed; 0.5 grm. of the sample is ignited in a Mars furnace at 1,350 deg. in a current of oxygen, using a combustion tube 20 mm. internal dia. and 750 mm. long. Ignition takes 1 min. Gaseous products of combustion are passed into a graduated beaker containing 75 cc. hydrogen peroxide (150 cc. perhydrol, 100 cc. 6 per cent. K-sulphate solution, 4 drops sulphuric acid (1 + 6) and 15 l. water). Oxygen is passed through the solution for a further 3 min. to expel the CO, timing with an alarm clock, and then the sulphuric acid formed titrated with normalised NaOH, the endpoint being determined potentiometrically. (Time of titration ½ min., total time of determination including weighing 5¼ min.) Sulphur content is read off on a table. NaOH is standardised by combustion of a standard pig-iron with known sulphur content.

Special apparatus has been designed to accelerate absorption and titration, and a four-way tap placed in the oxygen circuit to avoid the tedious sweeping out of the gas tube; this tap ensures that, on opening the Mars furnace, a slow current of oxygen passes into the titration vessel, which prevents the absorption liquid rising in the gas tube and long scavenging after combustion and before titration.

Determination of Silicon

Silicon is estimated by the perchloric acid method; 1 grm. of the sample is treated in a 500 cc. beaker with 25 cc. 66 per cent. silica-free perchloric acid (10 parts 70 per cent. perchloric acid with 1 part of water) and heated by a flame. The perchloric acid concentration must be carefully adjusted, as at higher concentrations reaction is too violent, while at a lower concentration the velocity of solution is reduced. At the beginning of solution, the sample froths; when the main reaction has ceased, boil again with shaking, to remove any residues of the sample from the walls (solution takes about 2 min.); 100 cc. of water is then carefully added, so that the solution does not froth, and the solution passed through a filter pad 1 cm. thick by a filter pump. Water is best added through a long glass tube curved at the end and connected by rubber tubing and pinch cock to a water bottle, this prevents the perchloric acid splashing. The beaker is washed out and the precipitate washed twice with hydrochloric acid and three times with hot water. Time taken for filtration and washing, 1 min. The filter plug is ignited in a platinum boat (50 × 40 × 10 mm.) in an electrically-heated furnace in a current of oxygen (time 2 min.). The residue is weighed on a quick-reading balance and the percentage of Si read off from a table (time ¼ min.). Total time of estimation including weighing, 6¼ min.

UNDERFEED STOKERMAKERS' ASSOCIATION

An Underfeed Stokermakers' Association, affiliated to the Combustion Appliance Makers' Association, has been formed with headquarters at 12, Rickett Street, London, S.W.6, to further the interests of the underfeed stokermakers and in particular to take into consideration problems which face the underfeed stoker industry during the war.

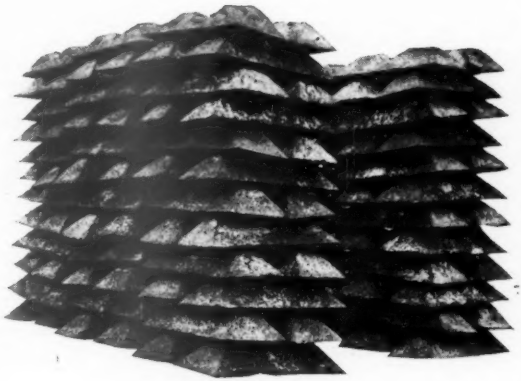
The chairman of the new association is Mr. F. P. D. Scott, of Prior Burners, Limited, and the other founder members are: Ashwell & Nesbit; Bastian & Allen; Joshua Bigwood & Son; Binns & Speight; Colostat Combustion Systems; Combustions; France, Harry & Company; Hartley & Sugden; Hope's Heating & Lighting; Mechanical Coal Stokers; Mirrlees Bickerton & Day; Prior Burners; Riley Stoker; Sharpe's Engineers; John Thompson (Triumph Stoker); and Nuway Heating Plants.

WELSH ENGINEERS AND FOUNDERS

At the annual meeting of the Welsh Engineers' and Founders' Association, held at Swansea, Mr. W. E. Clement presiding, Mr. W. J. Rees, Llanelly, retired from the presidency and Mr. John Evans, of John Evans, Limited, Lower Forest Foundry, Morriston, one of the founders of the Association and for many years vice-chairman of the committee, was elected in his place. Mr. Clement was re-elected chairman, and M. A. J. Burn, Llanelly, was appointed vice-chairman.

STANTON

PIG IRONS *are* MACHINE CAST



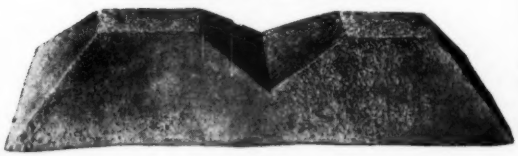
The excellence of Stanton, Holwell and Rixons pig irons seemed to leave no room for improvement until Machine Casting came along. This method of manufacture eliminates sand, eliminates sows and produces a pig which is 100% iron and free from coarse graphite. It is clean working and economical of fuel in the cupola. Stanton Machine Cast Pigs have a shape which makes for easier handling and better stacking.

Specification

Weight	...	80—90 lbs.
Length	...	22 inches
Width	...	8½ inches
Thickness	...	3½ inches
(at notch 2 inches)		

New shape
Better stacking

The chemical analysis and well-known physical properties of each brand remain unaltered.



A modern Pig for modern needs

THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

OBITUARY

MR. GEORGE H. HALEY, managing director of E. & W. H. Haley, Limited, ironfounders, of Bradford, died on July 8.

MR. ROBERT KIDSTON, managing director of Bennett's Ironfoundry Company, Limited, Stockport, died suddenly on July 8.

MR. EDGAR ARTHUR WHARTON, proprietor of E. A. Wharton & Son, iron and steel stockholders, of Heckmondwike, died recently. He was 70 years of age.

MR. JOHN NAISMITH MCARTHUR, who died recently, was for many years a well-known figure in the iron trade in the West of Scotland. After being associated with James Dunlop & Company, Limited, former owners of the Clyde Ironworks, he joined the pig-iron department of the Glasgow Iron & Steel Company, Limited, 18 years ago, and later was transferred to the company's coal department.

MR. ARTHUR HUGH WOLSELEY, managing director of Charles Clifford & Son, Limited, metal rollers, of Birmingham, whose death was briefly reported in our last issue, was 81 years of age. He had been associated with the company for over 60 years, having joined the staff in 1880. He was appointed secretary of the company in 1897, and in 1910 became general manager. He was made a director in 1911 and was appointed managing director in 1918. Mr. Wolseley had been chairman of the Brazed Brass Tube Association, the Brass and Copper Tube Association, and of the Cold Rolled Brass and Copper Association. He was one of the founders of the British Non-Ferrous Metals Research Association, and had served on the Technical Committee of the British Standards Institution.

A NOVEL WORKING SCHEDULE

For more than four years the Gray Chemical Company, an up-to-date American wood distillation plant, has successfully operated a novel working week which provides the same conditions for all employees and gives each worker five periods of 24 hrs. off every week. The working schedule appears at first sight to be somewhat complicated, but closer examination shows that it follows the simplest possible pattern.

The plan is based on the substitution of new time units: instead of a 24-hr. day, a 32-hr. cycle (four 8-hr. shifts); instead of a seven-day week, a four-day rotation; and instead of a calendar month, four weeks (28 days of seven rotations), which period acts as a common denominator of days, shifts, cycles, and weeks. In operations requiring 168 hrs. of work per week, scheduling is usually done with four operators, one of whom must always be at the post. On equal division of time, each worker must spend one-quarter, or 42 hrs. per week. "A" works 8 hrs., is off 24 hrs., and repeats indefinitely without change. "B" takes over at the end of "A's" shift, and then is also always on 8 hrs. and off 24. "C" follows "B" in the same way, and "D" always follows "C" to complete the cycle.

NEWS IN BRIEF

THE EIRE GOVERNMENT has issued an Order continuing the prohibition, except under licence, of the export of scrap iron and scrap steel until July 30, 1943.

EMPLOYEES of John Lysaght, Limited, are to give 30 lockers, at a cost of £135, for the new orthopædic fracture unit of the Royal Gwent Hospital, Newport.

MALLEABLE-IRON CASTINGS production in the United States in the March quarter totalled 202,696 tons, as against 198,281 tons and 135,416 tons in the comparable periods of 1941 and 1940 respectively.

THE NATIONAL ARBITRATION TRIBUNAL has turned down a claim by the maintenance craftsmen's labourers in William Beardmore & Company's Parkhead works for the full bonus paid to craftsmen.

THE POSSIBILITY OF USING zinc and brass die castings instead of aluminium in the manufacture of artillery fuses was discussed recently in America by the technical sub-committee of the Defence Industry Advisory Committee for the Die Casting Industry.

A MEETING of the London Local Section of the Institute of Metals will be held at the Junior Institution of Engineers, 39, Victoria Street, S.W.1, on July 23 at 6.30 p.m., when Dr. C. E. Ransley will give an address on "Some Reactions between Gases and Metals." The address will be illustrated by a colour film taken in the research laboratories of the General Electric Company, Limited.

IN PARLIAMENT

Refractory Material for Furnaces

MR. R. MORGAN asked the Minister of Supply whether he would take steps to ensure that an adequate supply of refractory material was available for the construction and repair of furnaces.

SIR A. DUNCAN: The supply of refractory material for furnaces is being kept under constant supervision and it is not anticipated that any serious difficulty will be encountered in meeting probable demands.

In reply to another question on the same subject, MR. ERNEST BEVIN (Minister of Labour) said he was not aware that the refractories industry was suffering any exceptional difficulty owing to the shortage of skilled labour. It was not practicable to designate the manufacture of refractory goods as a munitions industry, because it formed only a small, though important, section of other industries which were not themselves munitions industries. The most skilled occupation, however, was treated as a vital war occupation, which had the same effect as inclusion in the munitions industries, and he was considering the possibility of adding other occupations. It was, of course, open to employers to apply for the deferment of calling-up of any of their workers who were liable under the National Service Acts and were not reserved.

MACNAB MOULDING MACHINES

for High Production

LATEST ENCLOSED SAND PROTECTED JOLT SQUEEZE MOULDING MACHINE

SPECIAL FEATURES:

- MASSIVE YET SYMMETRICAL CONSTRUCTION.
- JOLT RAM—A REAL BLOW.
- SQUEEZES TO A SET PRESSURE.
- PATTERN DRAW—STEADY AND SMOOTH.
- AIR ON OIL CONTROL TO DRAW.
- MECHANISM SAND PROTECTED.
- PATENT AIR-LOADED DISC VALVES.

In the up-to-date foundry of a well-known ordnance factory large quantities of non-ferrous castings are produced for anti-aircraft guns.

MORE THAN 350 MACHINES OF THIS TYPE HAVE BEEN SUPPLIED.

Accuracy is particularly important and Macnab Moulding Machines are used for all operations.

MACNAB Moulding Machines mean CLEAN, ACCURATE AND WELL FINISHED moulds—There are many sizes and types, suitable for economical production of varying classes of work. Full details will be sent on request. . . . . .

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COMPANY NEWS

(Figures for previous year in brackets.)

Newton Bros. (Derby)—Dividend of 15% (12½%).

Mirrlees Bickerton & Day—Dividend of 6% (same).

Christy Bros. & Company—Ordinary dividend of 12½% (11%).

Fisher & Ludlow—Profit, £102,941 (£105,457); dividend of 15% (same).

G. Hopkins & Sons—Trading profit for 1941, £13,788 (£11,424); no dividend.

Telegraph Construction & Maintenance—Interim dividend of 5% (same).

George Kent—Final dividend of 7% and a bonus of 2½%, making 12½% (same).

Scottish Machine Tool Corporation—Net profit, £83,287 (£74,865); dividend of 8% and a bonus of 2%, making 10% (6%).

A.B.C. Coupler & Engineering—Net profit, after tax, for year to September 30, 1941, £5,767 (£4,751); ordinary dividend of 10% (same).

Guest, Keen & Nettlefolds—Final ordinary dividend of 6%, less tax, making 10%, less tax, for the year to March 31 (5%, tax free).

Swan, Hunter & Wigham Richardson—Net profit, after tax, for 1941, £312,568 (£238,445); to reserve, £70,000; forward, after preference and ordinary dividends, the latter of 10% (same), and £25,000 to staff fund, £33,137 (£34,066).

Wilkes Berger Engineering—Net profit for 1941, £35,894 (£38,402); reduction of reserve in respect of subsidiary companies, £5,500; reserve for taxation, £19,227 (£8,157); to preference share redemption fund, £3,075 (£2,775); ordinary dividend of 15% (12½%); forward, £14,935 (£4,704).

Edgar Allen & Company—Net profit for the year ended March 31, after provision for taxation, A.R.P. and war damage contributions, £39,891 (£44,439); dividend on the cumulative preference shares, £7,500; dividend on the ordinary shares of 12½% (same), £17,956; to general reserve, £15,000; forward, £36,341 (£36,907).

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Beryllium Smelting Company, 122, London Wall, London, E.C.2—£1,000. V. H. Frank and D. David.

White Sand & Silica Company—£10,000. J. Bennett, Granite House, Cannon Street, London, E.C.4, subscriber.

Wallis & Longden, Trent Works, Peel Street, Long Eaton, Derbyshire—Engineers, founders, etc. £15,000. N. P. Longden.

Brierley Engineering Company—£1,000. K. Brierley, 8, Wertholm, Letchworth; A. E. Nickels, and J. C. Knowles.

Bracewell's (Nelson), 8, Ormerod Street, Burnley—Engineers, toolmakers, metal and alloy makers, etc. £1,000. H. and A. J. Bracewell, E. B. and E. Clegg, and J. Clough.

PERSONAL

MR. WILLIAM SCOTT, manager of Jarrow Metal Industries, Limited, Jarrow-on-Tyne, has been elected to Jarrow Town Council.

MR. J. G. SHAW, who has been a director of Lancashire Dynamo & Crypto, Limited, for many years, has been appointed vice-chairman of the company.

MR. HENRY HARLAND, M.P., London director of Harland & Wolff, Limited, shipbuilders and engineers, recently underwent an operation from which he is now recovering.

MR. S. H. LE TALL, chairman and managing director of Watson, Saville & Company, Limited, has been elected president of the Crucible Steel Makers' Association, Sheffield.

MR. D. A. BREMNER has announced his intention of relinquishing the position of director of the British Engineers' Association, which he has held for 24 years. His services will still be available to the Association in an advisory capacity.

MR. W. E. CLEMENT, of Thomas & Clement, Limited, Morfa Engineering Works, Llanelly, Mr. H. Leighton Davies, of Baldwins, Limited, and Mr. Leonard Gould, of Gould's Foundries, Limited, represent the employers on the Regional Production Board for Wales, of which Mr. Percy Thomas is chairman.

RESTRICTED HOLLOW-WARE SUPPLIES

A long list of classes of goods whose manufacture and supply will be regulated by licence from August 1 has been issued by the Board of Trade. In the case of hollow-ware and kitchen ware, mainly or wholly of metal, manufacturers can supply goods (except aluminium ware) completely finished before August 1 during the period August 1 to September 30. Manufacture of certain articles will not normally be licensed. The manufacture of metal furniture, excluding aseptic hospital furniture, will be regulated by licence, and in the case of domestic electrical appliances, licences will be at the general rate of 25 per cent. of pre-war supplies. Goods whose manufacture and supply is prohibited from August 1 except by licence, which will be granted only in exceptional circumstances, include cutlery, hearth furniture and art metalware.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"MUREX"—Weighing and measuring apparatus. MUREX, LIMITED, Ferry Lane, Rainham, Essex.

"LA BOUR"—Centrifugal pumps. BRITISH LABOUR PUMP COMPANY, LIMITED, Blundell Street, London, N.7.

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G.P. 152

Raw Material Markets

IRON AND STEEL

The supply position in high-phosphorus iron remains quite easy, but better-quality material is not coming forward in anything like the same tonnages, and distribution is strictly controlled. The chief users of high-phosphorus iron are the makers of light castings, who are not now doing a very big turnover, so that their iron requirements are much below pre-war levels. This is offset to some extent by the fact that heavy engineers and speciality foundries generally are utilising high-phosphorus iron to eke out their allocations of low-phosphorus iron, hematite and other grades which they experience some difficulty in obtaining. Thus, in the aggregate, consumption of high-phosphorus iron is quite substantial.

It cannot be expected that the light-foundry trade will experience busier conditions until after the war, as this section of the industry is not equipped to cater for the special needs of the various Government departments, while ordinary domestic business and export trade are not encouraged by the authorities and are, in fact, officially controlled, so that the volume of orders accepted by light-castings manufacturers is restricted to but a fraction of normal business. Jobbing foundries employed on specialities are generally well situated, and are in the market for large tonnages of iron.

In the heavy engineering section there are very active conditions at all works, orders from the Government keeping them fully employed. Most engineers' order-books are filled over a considerable period ahead, and a certain amount of non-official business is having to be rejected from time to time on account of the pressure from Government buying agencies. Despite the difficulties attendant on procuring supplies of low-phosphorus iron and hematite, these works are being kept in continuous operation and are being urged to accept additional quantities of refined and medium-phosphorus irons, together with a proportion of steel scrap. High-phosphorus iron, which is produced from ores located in the United Kingdom, is also finding its way into the heavy engineering works, and a fair amount of this material is being incorporated in mixtures, with satisfactory results.

The quantity of foundry coke in stock at many consuming points has assumed quite large proportions, and all orders are being promptly attended to by producers. Coke ovens also have considerable reserves on which to draw, and as transport is operating satisfactorily, buyers are procuring their supplies with the minimum of delay. As stated last week, the price of foundry coke has been increased by 6s. 6d. to meet the increased coal prices. Best Durham coke is now quoted at 53s. 3d. at ovens, the price delivered Birmingham and Black Country stations being 69s. 3d. Blast-furnace coke has now also been advanced, the "at ovens" figure for Durham makes being 44s.

Light steel sections continue to be more active than heavy structurals, and more orders could readily be accepted for the latter. Heavy plates are in continued strong demand for the shipyards and other consumers, while heavy gauges of sheets are also moving away freely. There is only moderate activity in ordinary black sheets. Special-quality sheets, cold-rolled strip and bright-drawn steel bars are being called for on a big scale, and makers are fully booked up over some time ahead. Producers of high-carbon and alloy steels are operating to capacity, as these descriptions are used extensively in the production of munitions, armaments, etc.

NON-FERROUS METALS

There have been official intimations recently that consumption of copper in the production of large anti-tank guns and ammunition will be materially increased. Vast tonnages of the red metal have been absorbed over a lengthy period, but it is certain that the larger shell cases which are expected to be used in the future will call for still heavier supplies of copper. The supply position appears to be quite satisfactory and all the metal needed by priority consumers is forthcoming as the necessary licences are issued.

The drastic cuts in the consumption of tin, which have been forced on the industry by the trend of the war in the Far East, may, it is feared, have repercussions which will not be dissipated with the signing of the peace. "Tin," the official organ of the Tin Producers' Association, states that "it is true that much of the development, inventions and new processes which have resulted from the long-range war researches of the Tin Research Institute may eventually be adapted and exploited for post-war industrial use, but this cannot be described as true post-war planning. In the field of purely directive research it is unfortunately true that very little is at present being done by the tin industry either in Great Britain or America. Specially is this evident, and perhaps exaggerated, by comparison with the active research work being carried on by other great industries. Other industries allocate large sums of money for market exploitation. What is the tin industry doing in the direction of post-war planning?" asks the journal, adding that "the necessity for research and development becomes more urgent every day."

A survey of tin consumption is being carried out in the United States. Consumers are being requested to make known to the authorities details of their consumption of virgin tin, secondary tin and tin used in scrap during the first quarter of this year compared with the same quarter in 1940. The authorities also desire to know the purposes for which the metal is utilised.

Other news from across the Atlantic concerns the erection of five detinning plants for the recovery of tin from old tin cans. The Defence Plant Corporation has approved plans for the erection of the plants, but it is likely to be more than a year before the plants are in operation.

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